## AMENDMENTS TO THE CLAIMS

Claims 1-16 (Cancelled)

17. (Currently amended): A Carbon-Carbon bipolar plate for proton exchange membrane fuel cells ~~work piece~~ comprising machined features having dimensions between 0.1 millimeters and 1 millimeter.

18. (Currently amended): ~~The work piece of claim 17, wherein the work piece is a~~ A Carbon-Carbon heat exchanger core ~~; and wherein the machined features are~~ comprising a 2-D array of machined fluid passageways extending through the heat exchanger core, the fluid passageways having dimensions between 0.1 millimeters and 1 millimeter.

19. (Currently amended): The work piece of claim 17, ~~wherein the work piece is a polar plate for proton exchange membrane fuel cells; and~~ wherein the machined features are flow fields.

Claims 20-23 (cancelled).

24, (Reinstated, formerly claims 1, 11 and 15) A method of machining the bipolar plate of claim 17, the method comprising:

using at least one electrode to perform electrical discharge machining of the features in the bipolar plate, the electrode made of a material that is mechanically and chemically compatible with the bipolar plate.

25. (Reinstated, formerly claim 2) The method of claim 24, wherein an outer surface of the electrode is formed by a carbon-based material.

26. (Reinstated, formerly claim 3) The method of claim 24, wherein the electrode is made of a material selected from a group consisting of carbide, graphite, carbon and tungsten.

27. (Reinstated, formerly claim 5) The method of claim 24, wherein at least one electrode is scanned across the bipolar plate to machine different features.

28. (Reinstated, formerly claim 6) The method of claim 24, wherein arrays of the electrodes are used to machine different features in the bipolar plate.

29. (Reinstated, formerly claim 7) The method of claim 24, wherein the electrode has a shape of a portion to be removed from the bipolar plate.

30. (Reinstated, formerly claim 8) The method of claim 24, further comprising causing local surface oxidation of the bipolar plate during machining.

31. (Reinstated, formerly claim 9) The method of claim 30, wherein the local oxidation is caused by supplying an oxidizing dielectric to the bipolar plate.

32. (Reinstated, formerly claim 10) The method of claim 30, wherein the electrode is used to direct a dielectric onto the bipolar plate to cause the local surface oxidation.

33. (Reinstated, formerly claims 1, 11 and 13) A method of machining the Carbon-Carbon heat exchanger core of claim 18, the method comprising:

using at least one electrode to perform electrical discharge machining of the fluid passageways of the heat exchanger core, the electrode made of a material that is mechanically and chemically compatible with the core.

34. (Reinstated, formerly claim 2) The method of claim 33, wherein an outer surface of the electrode is formed by a carbon-based material.

35. (Reinstated, formerly claim 3) The method of claim 33, wherein the electrode is made of a material selected from a group consisting of carbide, graphite, carbon and tungsten.

36. (Reinstated, formerly claim 5) The method of claim 33, wherein at least one electrode is scanned across the heat exchanger core to machine the fluid passageways.

37. (Reinstated, formerly claim 6) The method of claim 33, wherein arrays of the electrodes are used to machine the fluid passageways.

38. (Reinstated, formerly claim 7) The method of claim 33, wherein the electrode has a shape of a portion to be removed from the work piece.

39. (Reinstated, formerly claim 8) The method of claim 33, further comprising causing local surface oxidation of the heat exchanger core during machining.

40. (Reinstated, formerly claim 9) The method of claim 39, wherein the local oxidation is caused by supplying an oxidizing dielectric to the heat exchanger core.

41. (Reinstated, formerly claim 10) The method of claim 39, wherein the electrode is used to direct a dielectric onto the heat exchanger core to cause the local surface oxidation.